F I G. 1 (a)

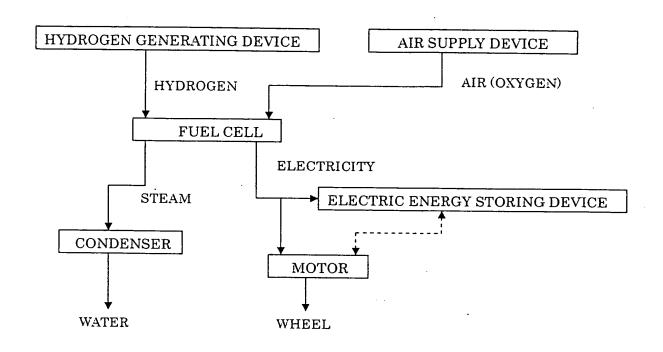


FIG. 1 (b)

16

24

30

10

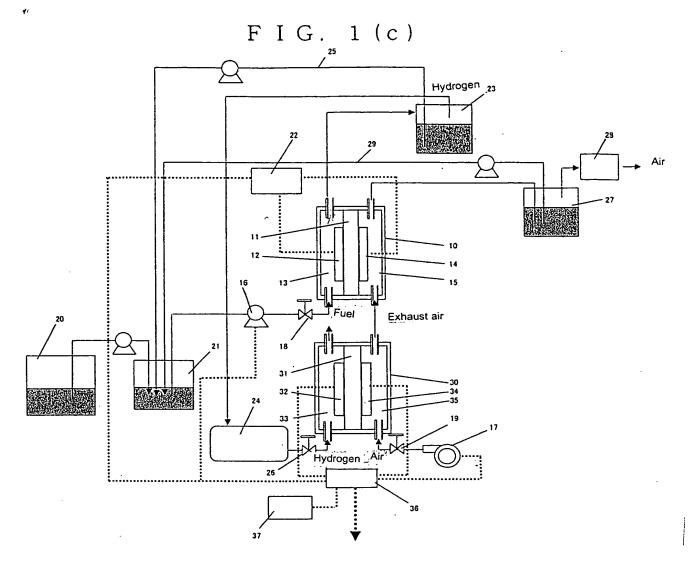
27

23

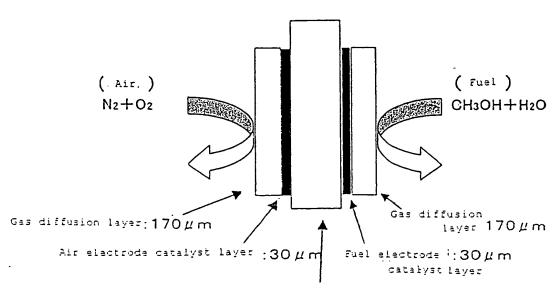
23

20

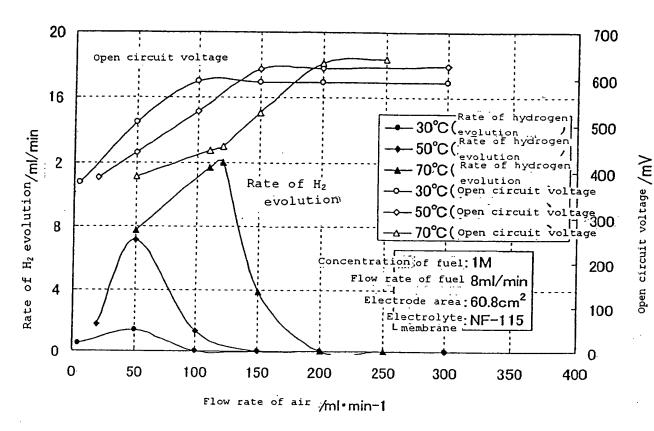
37



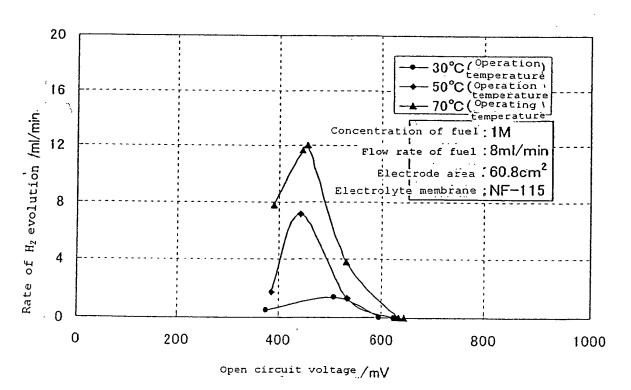
F I G. 2

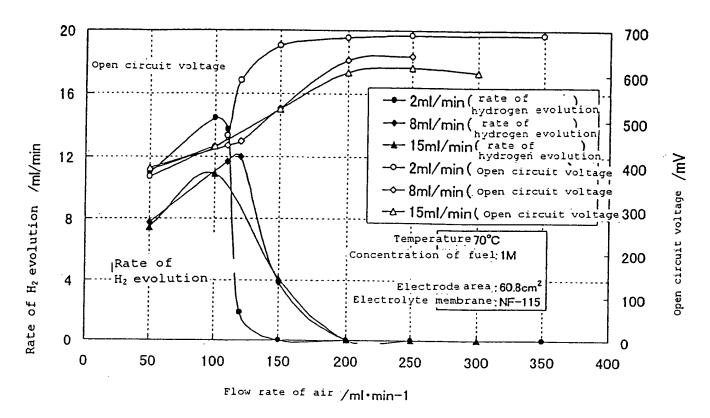


Electrosyte membrane (Nafion 115)

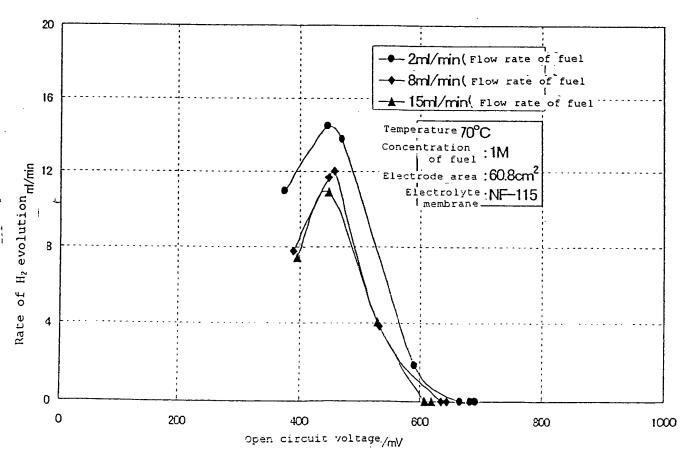


F I G. 4

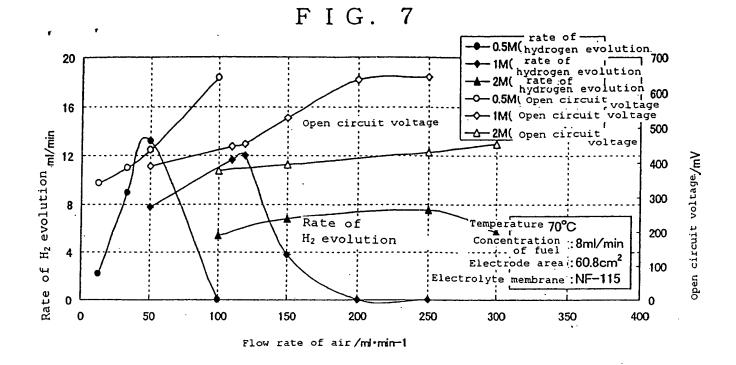


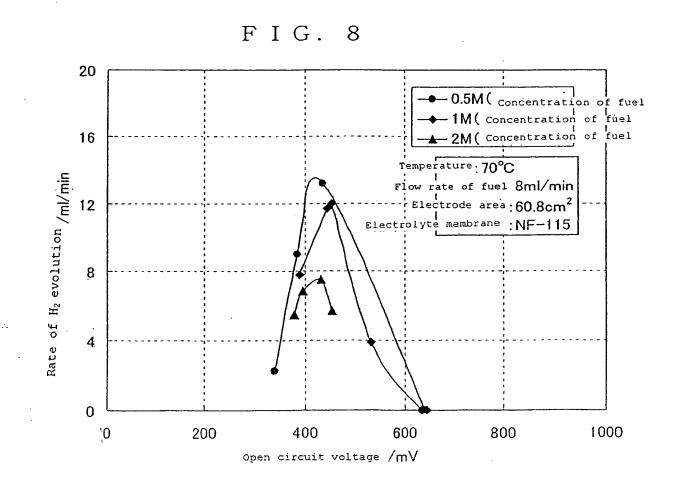


F I G. 6

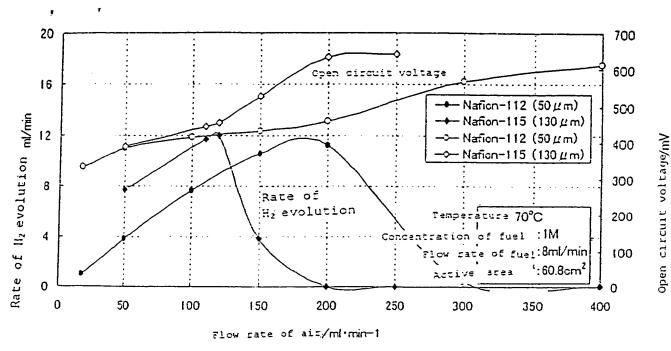


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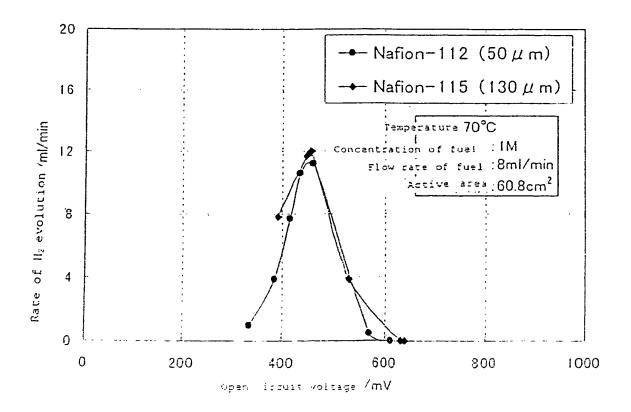




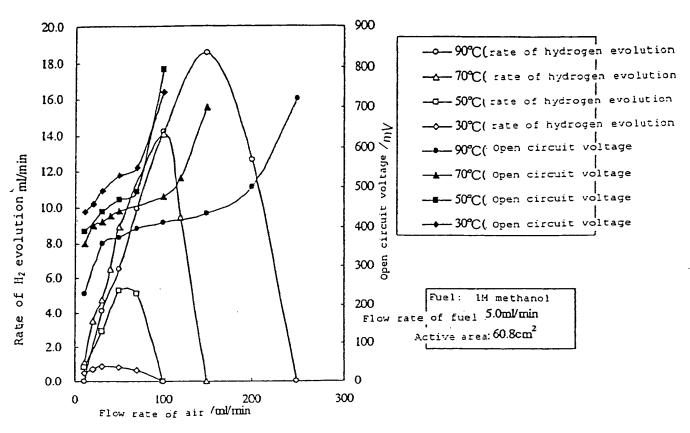
F I G. 9

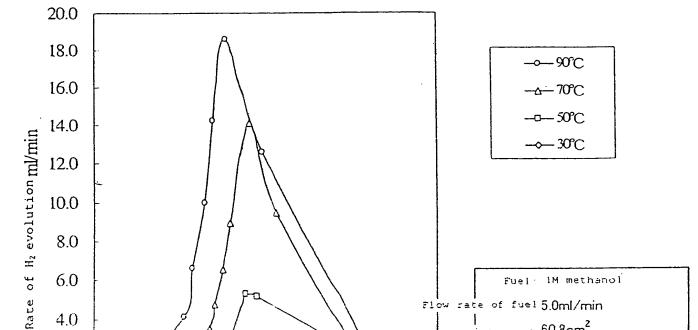


F [G. 10









600

2.0

0.0

200

400

Open circuit voltage/mV

Active area 60.8cm^2

800

7/37

F I G. 12

F I G. 13

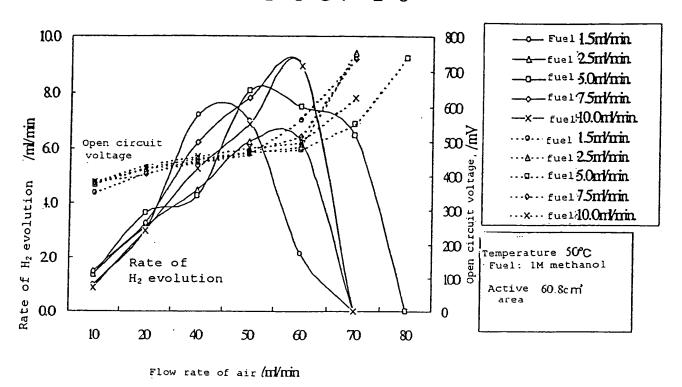
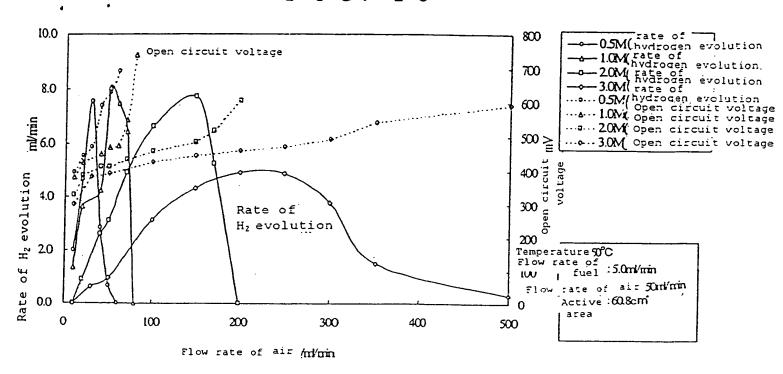
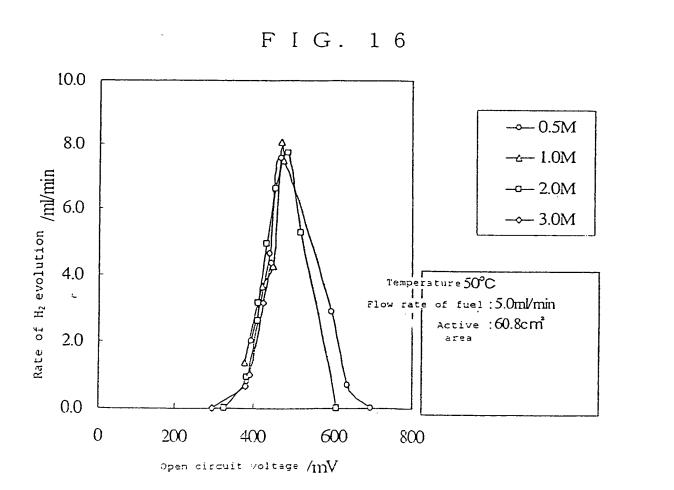
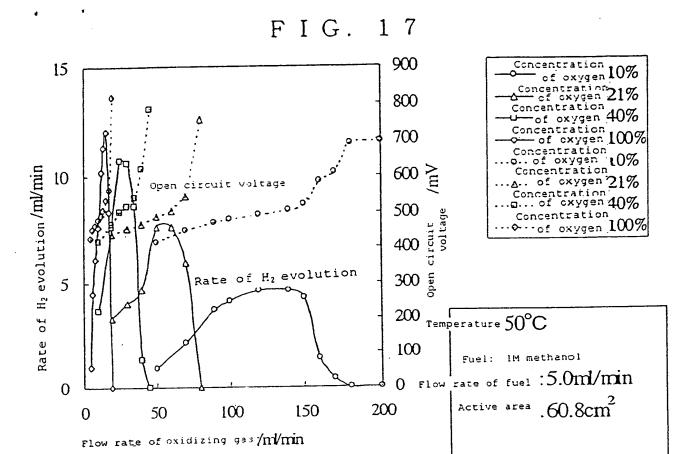


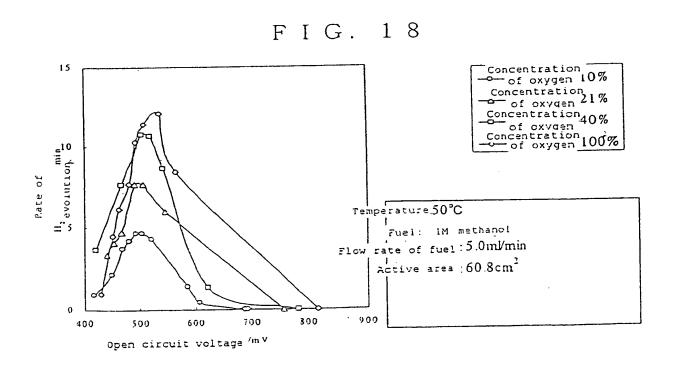
FIG. 14 10.0 _o_ fue L. 1.5ml/min. 4-fuel 2.5ml/min. 8.0 — fuel 5.0ml/min. Rate of H₂ evolution/ml/min ← fuel 7.5ml/min. -x- fuel ·10.0ml/min. 6.0 4.0 Temperature 50°C Fuel: IM methanol 2.0 60.8c m Active area 0.0 0 200 600 800 400

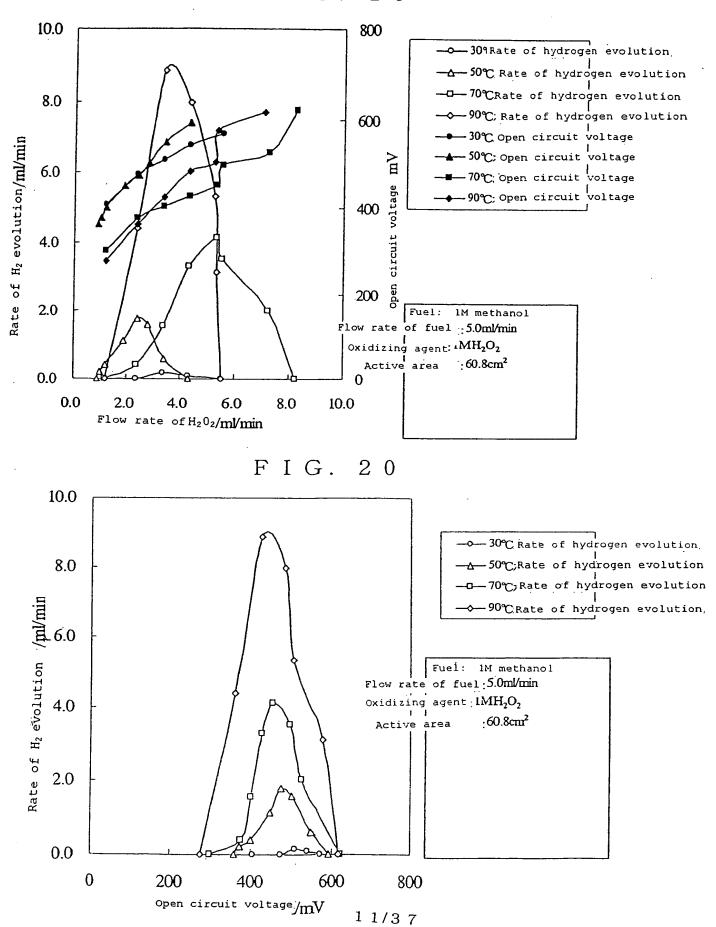
Open circuit voltage /mV



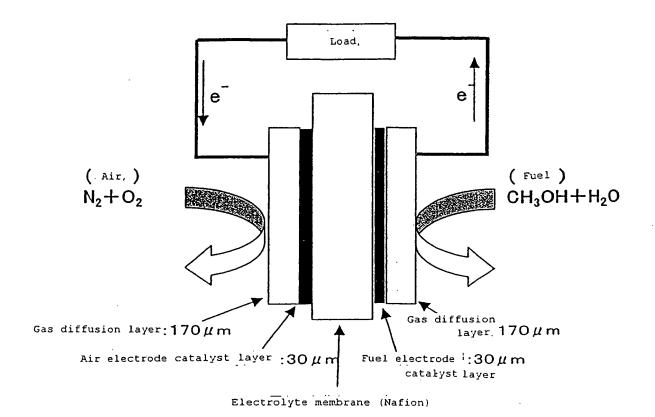




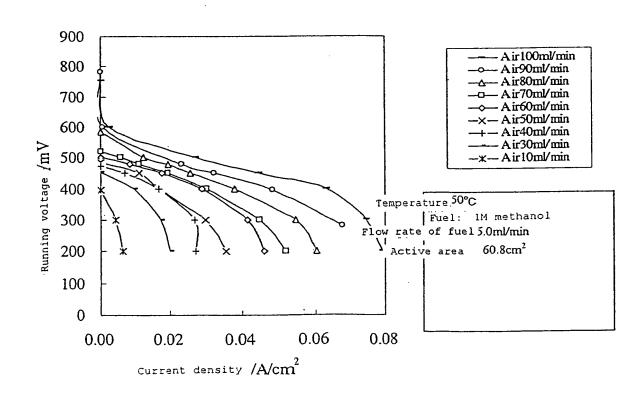




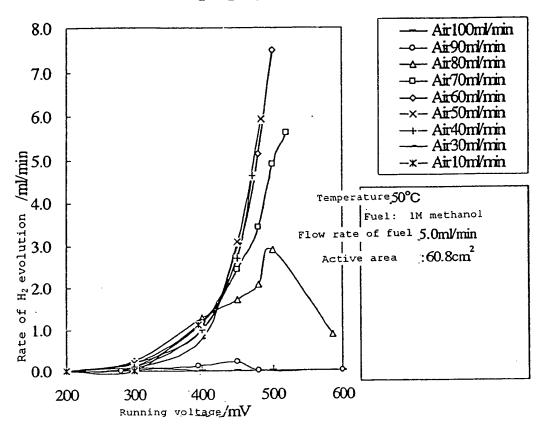
F I G. 21



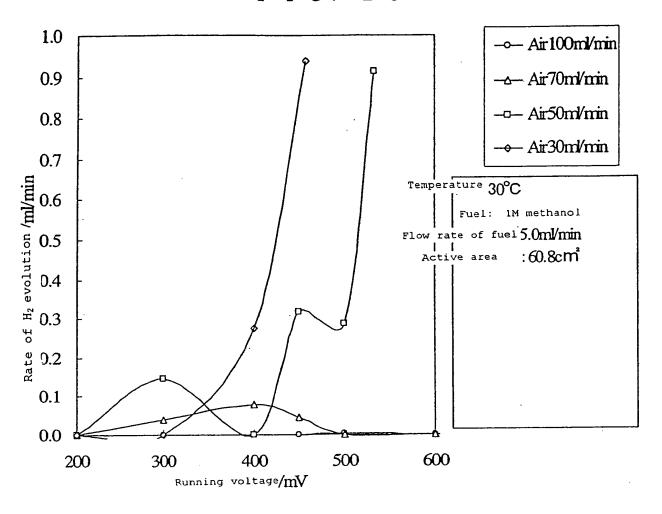
F I G. 22

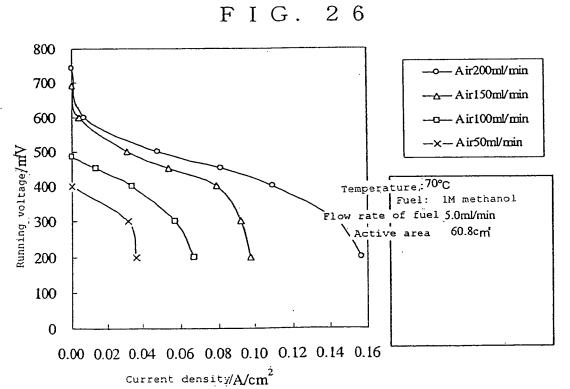


F I G. 23

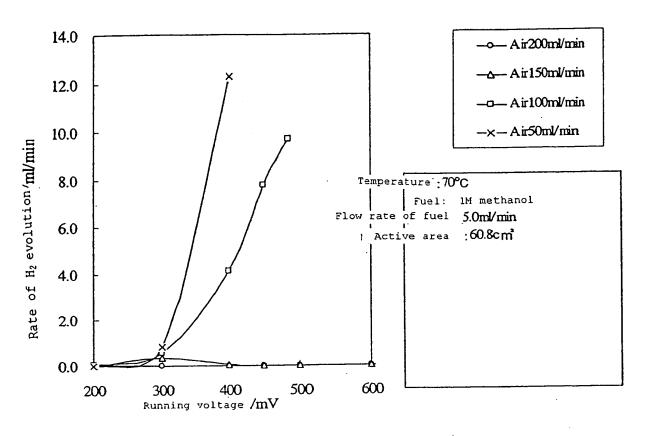


F I G. 24 800 – Air100ml/min 700 - Air70ml/min - Air50ml/min 600 - Air30ml/min 500 Running voltage/mV 400 ture 30°C Tempera Fuel: 1M methanol 300 Flow rate of fuel 5.0ml/min Active area :60.8cm 200 100 0 0.08 0.10 0.00 0.02 0.04 0.06 Current density/A/cm2





F I G. 27



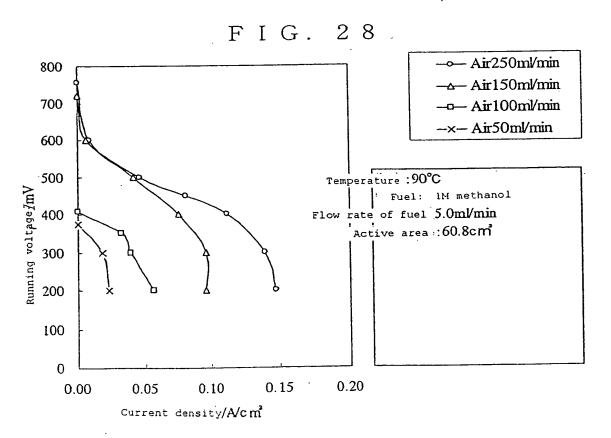
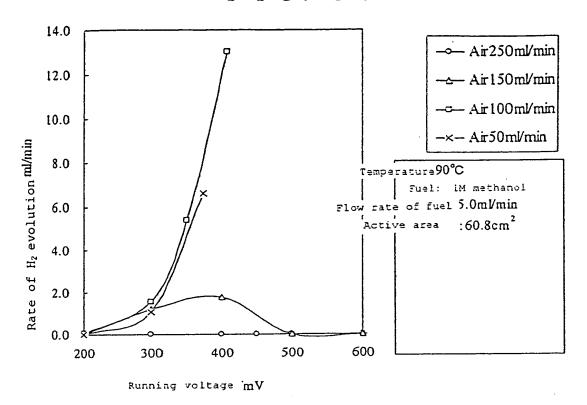
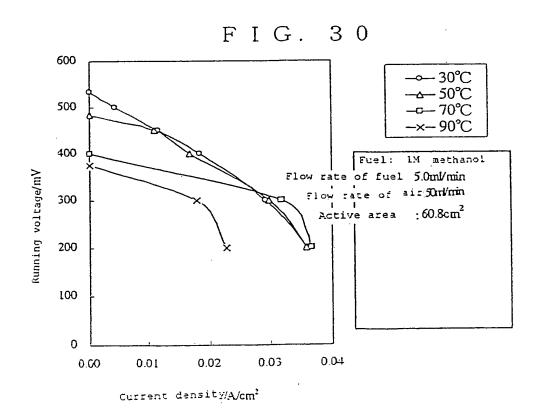
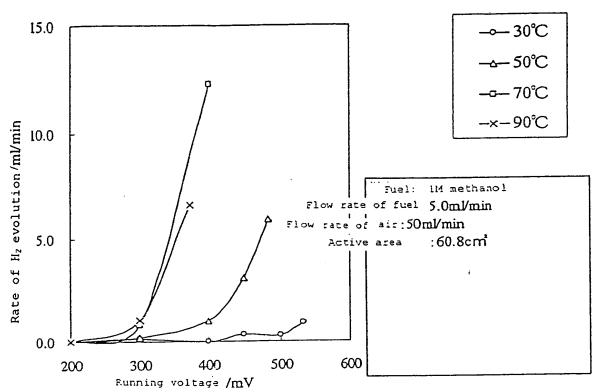


FIG. 29

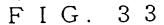


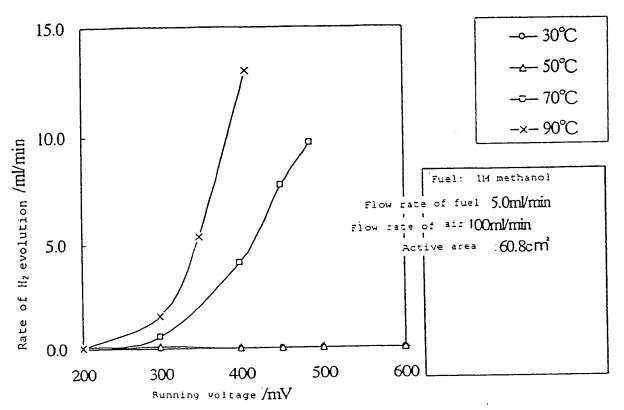


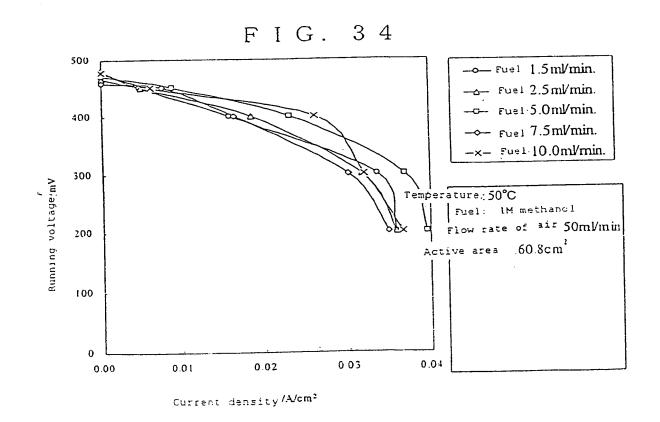
F I G. 31



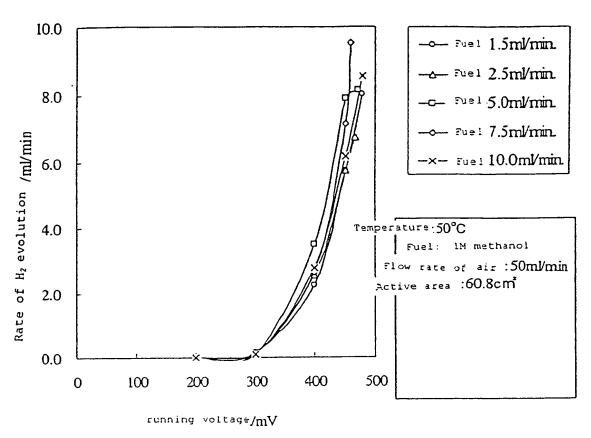
F I G. 32 -⊶ 30°C 800 --<u>-</u>⊶-- 50°C 700 <u>-</u>---- 70℃ 600 -×- 90°C 500 Running voltage /mJ/ 1M methanol 400 5.0ml/min Flow rate of fuel Flow rate of air :100ml/min 300 : 60.8cm 200 100 0 0.08 0.10 0.00 0.06 0.02 0.04 Current density/A/cm2

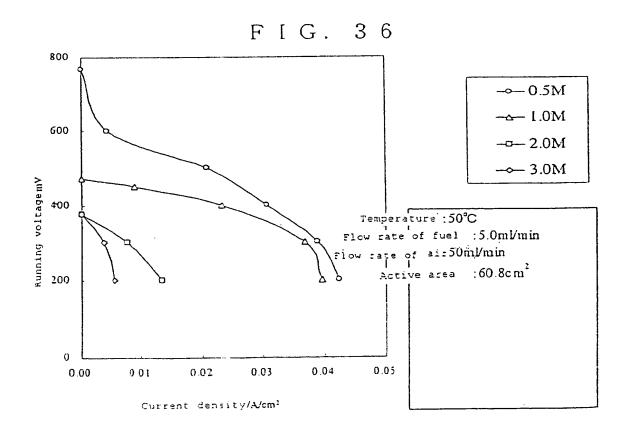




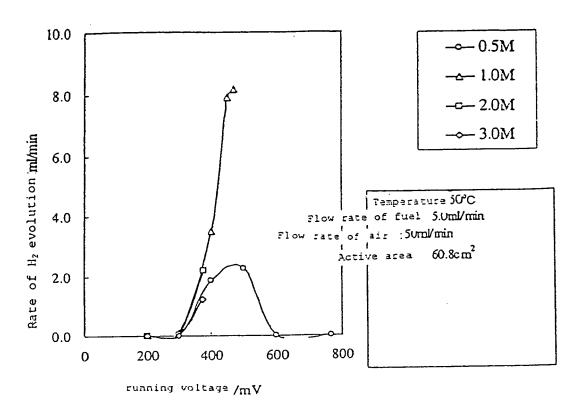


F I G. 35





F I G. 37



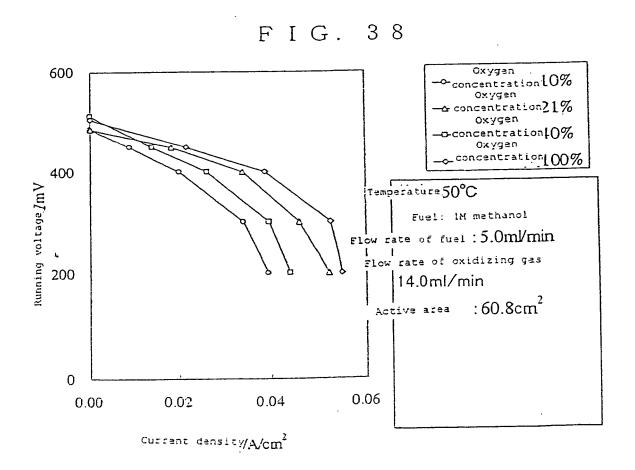
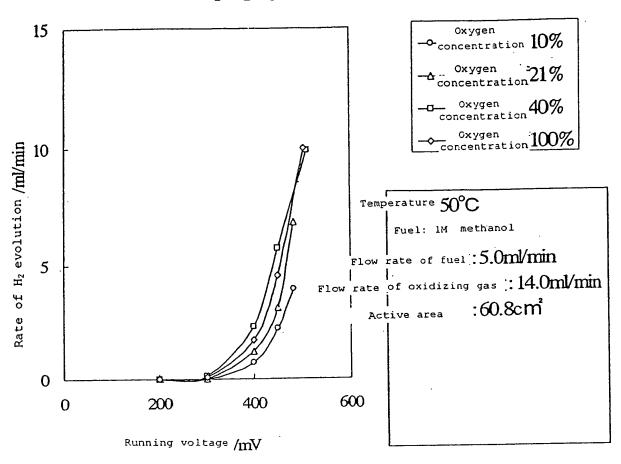
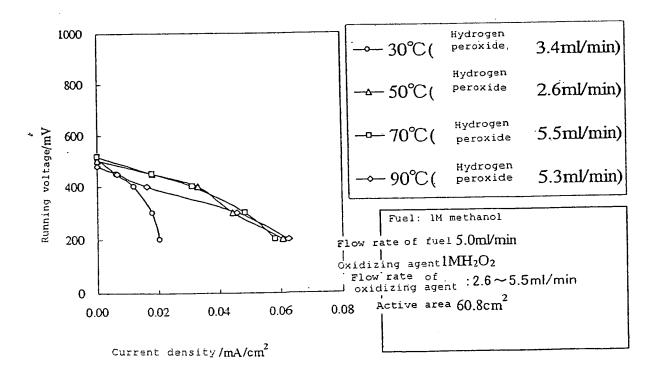


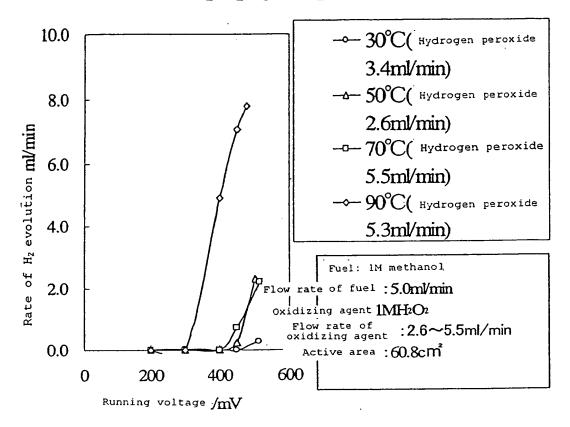
FIG. 39



F I G. 40



F I G. 41



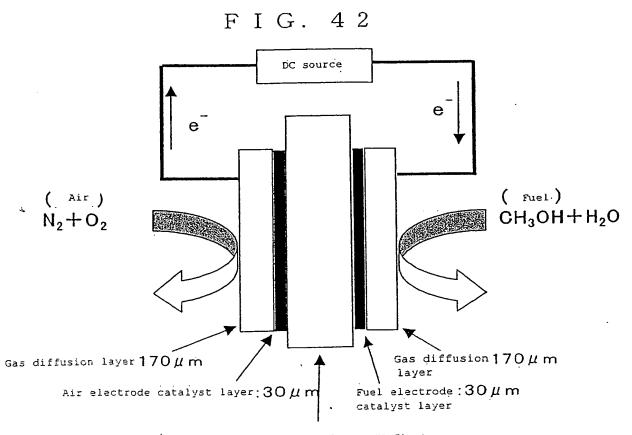


FIG. 43

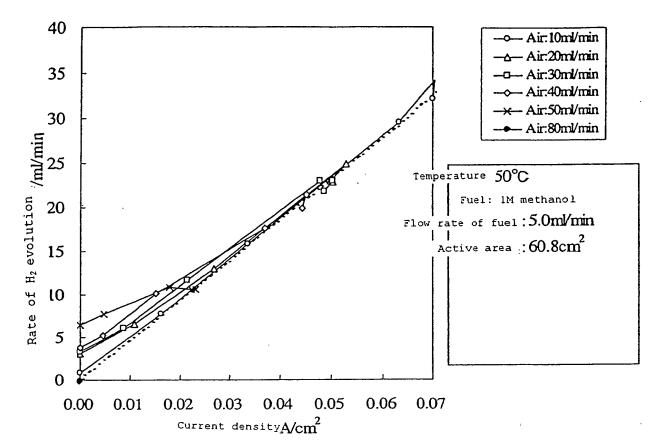


FIG. 44

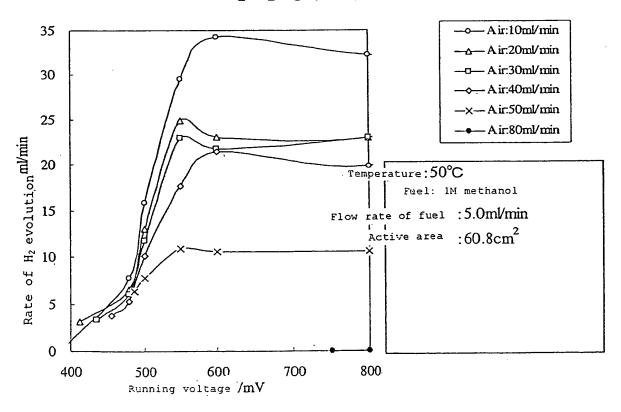
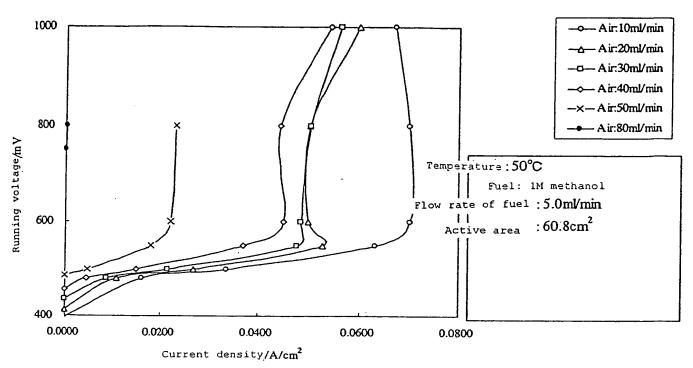
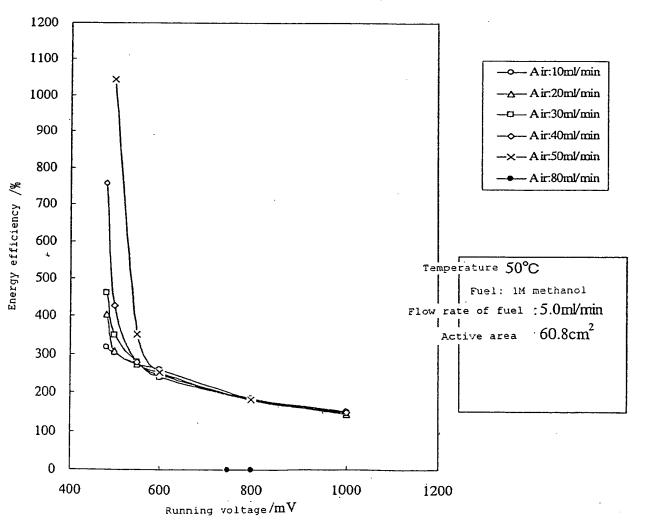


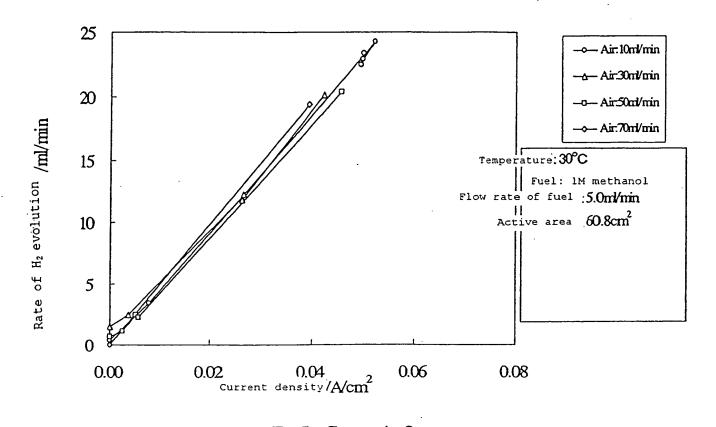
FIG. 45

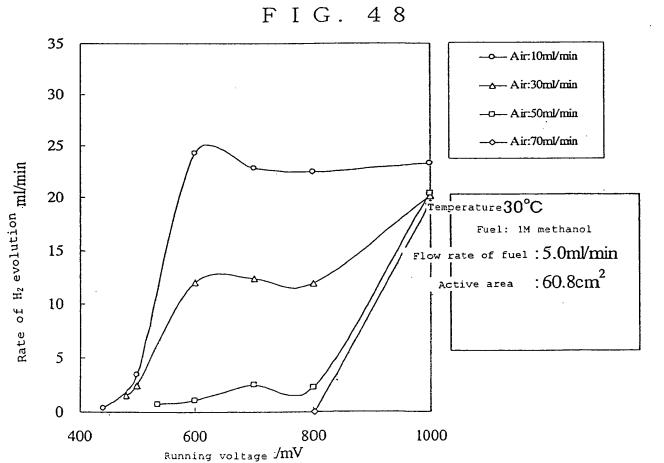


F I G. 46



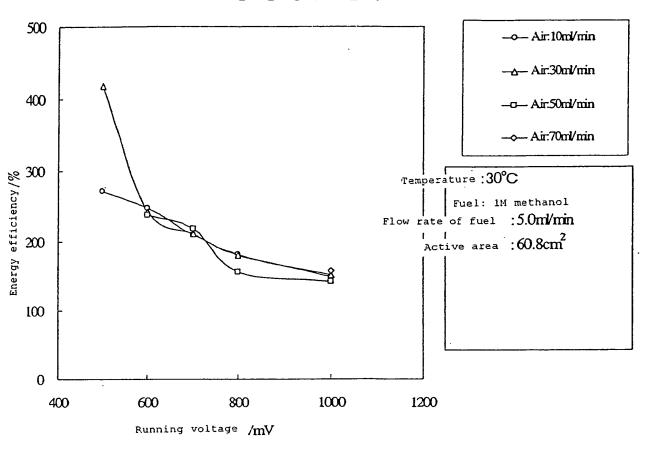
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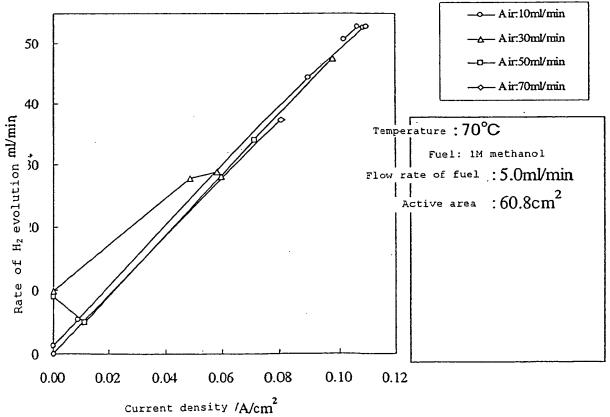


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FIG. 49

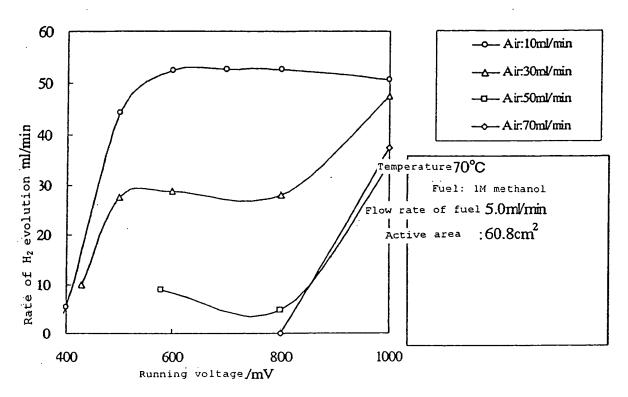


F I G. 50

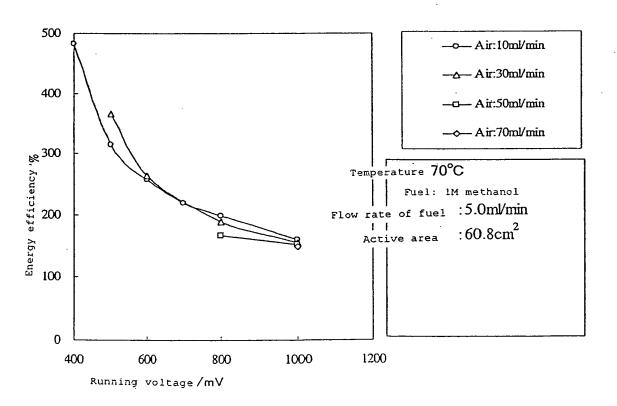


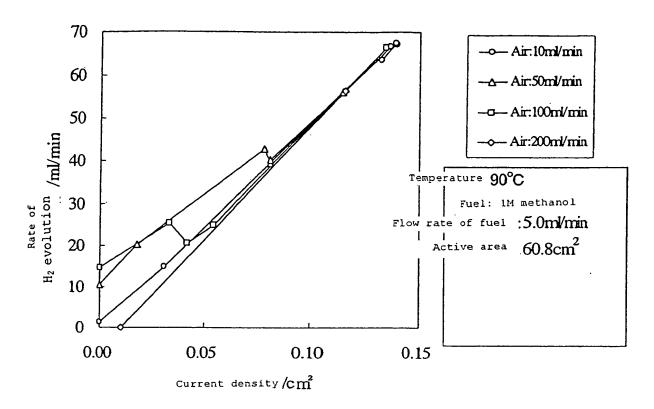
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F I G. 51

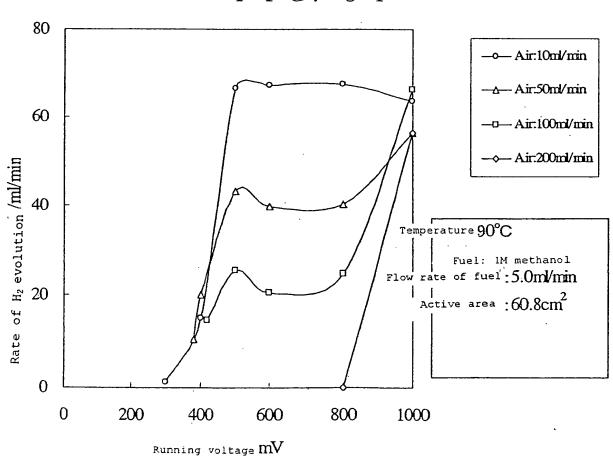


F I G. 52

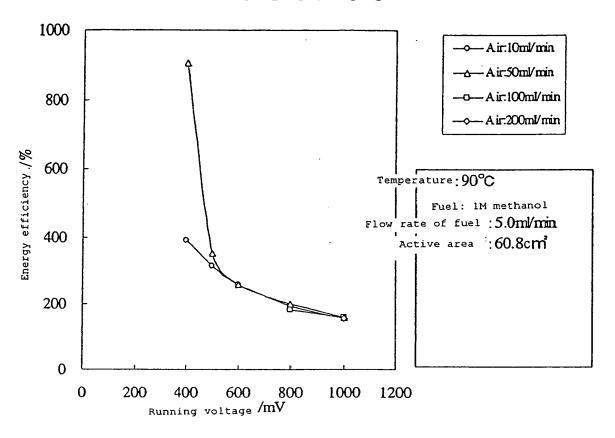


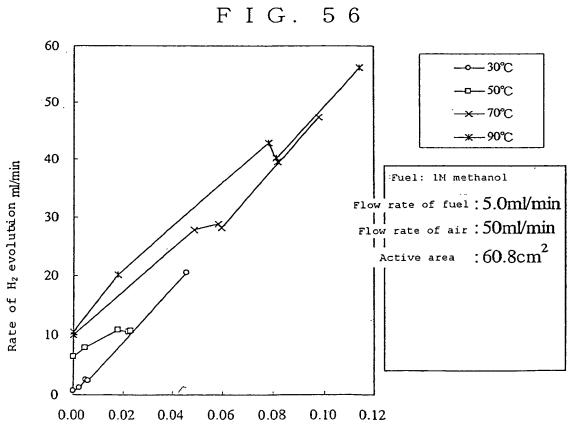


F I G. 54



F I G. 55





Current density/A/cm²

F I G. 57

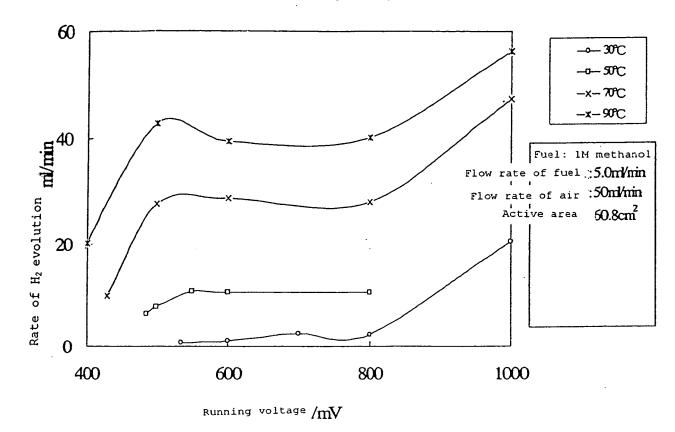
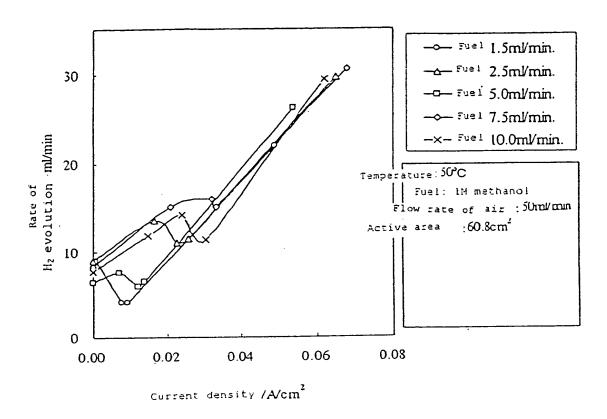


FIG. 58 1200 ----- 30°C –<u>4</u>— 50°C 1000 -- 70°C -×-- 90°C 800 Fuel: 1M methanol Energy efficiency 17% Flow rate of fuel:5.0ml/min 600° Flow rate of air :50ml/min | | Active area :60.8cm² 400 200 0 400 600 800 1000 1200 Running voltage /mV



John Tow rate of air :50ml/min Active area :60.8cm of the control of the control

800

600

Running voltage /mV

400

FIG. 60

1000

F I G. 61

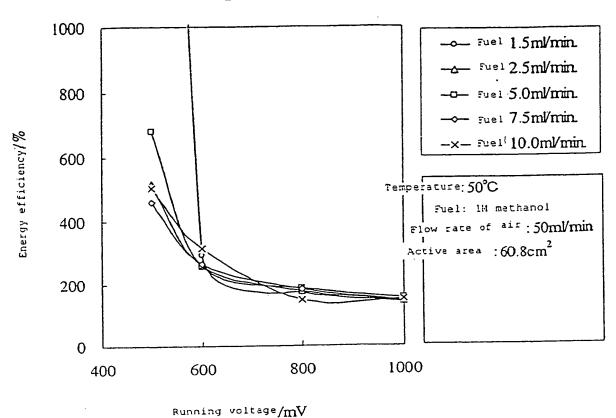
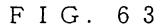
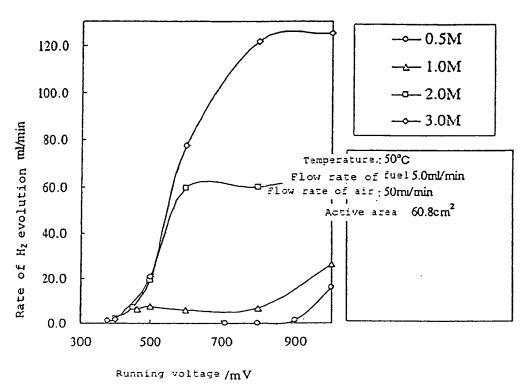
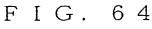
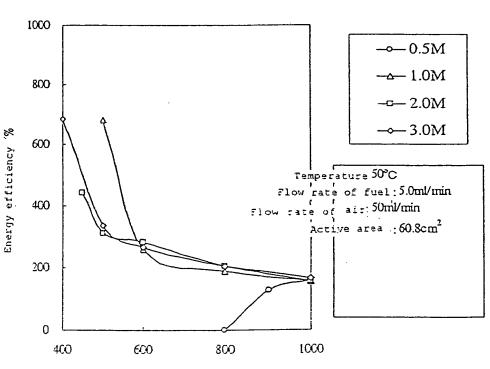


FIG. 62 150 ---- 0.5M 140 130 --△-- 1.0M 120 ----- 2.0M 110 100 H_2 evolution /ml/min ----- 3.0M 90 80 Temperature 50°C 70 Flow rate of fuel 5.0ml/min 60 of air :50ml/min 50 Active area : 60.8cm² 40 30 20 10 0 0.15 0.20 0.25 0.10 0.00 0.05 Current density'A/cm2

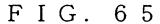


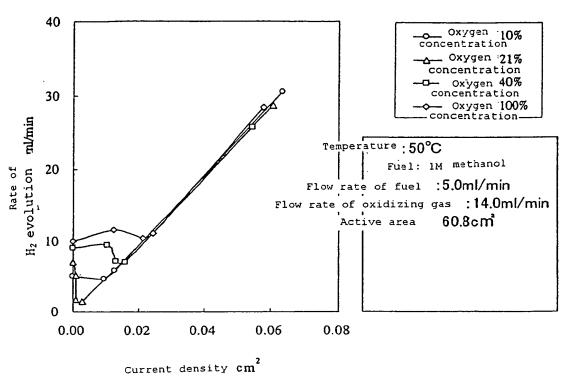






Running voltage /mV





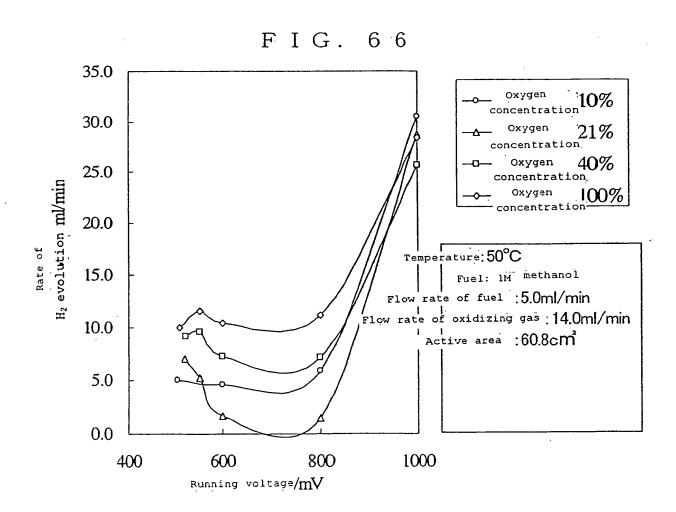
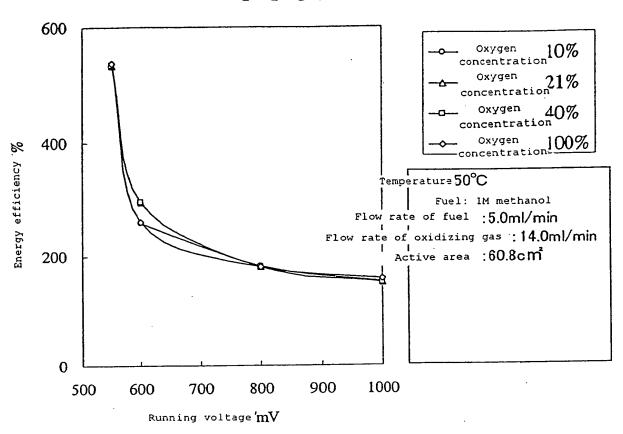
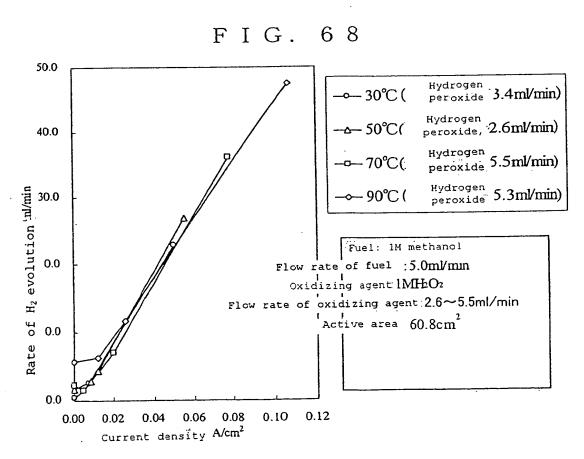
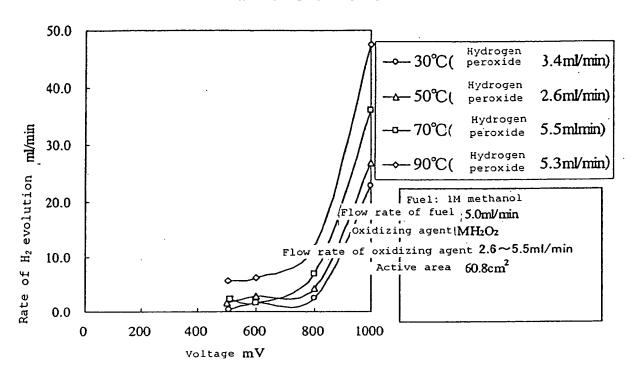


FIG. 67





F I G. 69



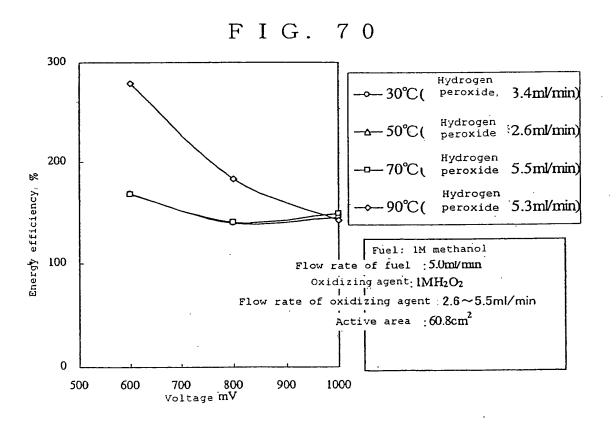
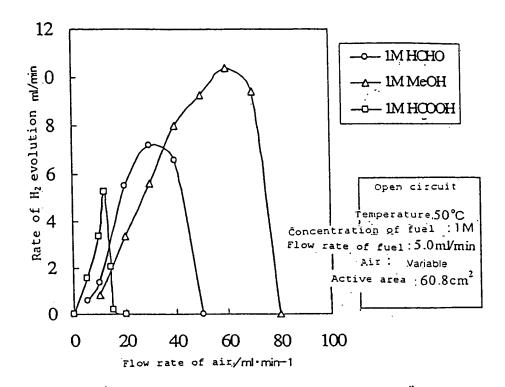


FIG. 71



F I G. 72

